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The NASA *Radiation Interuniversity Science and Engineering* (RaISE) Project:

A Model for Inter-collaboration and Distance Learning in Radiation Physics and Nuclear Engineering

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RaISE

- A NASA ***Radiation Interuniversity Science and Engineering*** (RaISE) Project
  - Undergraduate/graduate program in radiation physics and nuclear engineering
- Collaborators
  - NASA Johnson Space Center
  - NASA Langley Research Center
  - Prairie View A&M University (PVAMU)
  - Texas Southern University (TSU)
- Funded by NASA/Explorations Systems Mission Directorate

RaISE

- **Background**
  - Radiation is one of the top five risks for human space exploration
  - NASA has a critical need to further its knowledge in radiation science and the mitigation of this risk
  - NASA must expand its pool of research scientists and engineers trained to meet the challenges of human space flight and long-term planetary missions
  - White House Executive Order 12876, which mandates the support of HBCUs, strongly emphasizes developing the human resource potential represented by students served by HBCUs

- **Strategy**
  - Participating Institutions
    - Prairie View A&M University (PVAMU)
    - Texas Southern University (TSU)
  - Justification
    - Both these institutions are located within fifty miles of NASA Johnson Space Center, a lead center for Space Radiation Health Program.
  - Projected Outcome
    - Contribution to human resource development through special emphases on enhanced and advanced degree curriculum in this critical area among underrepresented minority students

- **Strategy (con't)**
  - Curriculum Focus
    - Radiation Physics
    - Radiation Biology
    - Radiation Measurements
    - Radiation Transport
    - Nuclear Engineering
  - Course implementation and delivery will be a staged approach with each institution delivering the courses as they are developed within their respective academic environments and on-line delivery between the universities via the NASA Goddard Minority University Space Interdisciplinary Network (MU-SPIN)

- **Institutional Assets**
  - Both, PVAMU and TSU, have NASA University Research Centers (URC) of Excellence
    - PVAMU: Center for Applied Radiation Research (CARR)
    - TSU: Center for Environmental Sciences and Biotechnology (CESB)
  - Physics Programs
    - PVAMU - expanding existing undergraduate program and developing a new graduate (RaISE) program
    - TSU – expanding undergraduate program with RaISE emphasis
  - Engineering
    - PVAMU – Expanding undergraduate nuclear engineering program and developing a graduate program with RaISE emphasis
  - Biology
    - TSU – Expanding a graduate program with RaISE emphasis with radiation biology emphases

RaISE

- **Guiding Principles for ESMD Support**
  - Content
  - Deliverables
  - Accessibility
  - Relevance
  - Customer Focus
  - Pipeline
  - Diversity
  - Management Plan
  - External Partners and Collaborations
  - Timeline
  - Metrics and assessment
  - Cost Effectiveness
  - Value-added

- Courses Conducted
  - Methods in Biomedical Sciences (Fall ‘05)
  - Molecular Biology I (Fall ‘05)
  - Radiation Biology (Spr ’06)
  - Computational Methods in Physics I (Spr ‘06)
  - Mathematical Methods in Physics I (Spr ‘06)
  - Intro to Electromagnetic Theory (Spr ‘06)
- Forty-eight students have enrolled in and completed the courses

- Courses and Laboratories Planned …
  - **Prairie View**
    - Intro to Nuclear and Particle Physics: Radiation Applications – 15 students expected (Fall 06)
    - Intro to Modern Physics and Radiation Science – 15 students expected (Fall 06)
    - Physical Sciences for non-majors (mostly education majors) – 300 students total, 30 students for RaISE emphasis (Fall 06)
    - Computation Methods in Radiation Transport (Spring 07)
    - Nuclear Engineering II (Spring 07)
    - Space Environments (Fall 07)
    - Radiation Measurements – Laboratory (Spring 07)
    - Radiation Quantities – Laboratory (Spring 07)

- Courses and Laboratories Planned …
  - **Texas Southern University**
    - Computational Methods in Physics II (Fall 06)
    - Mathematical Methods in Physics II (Fall 06)
    - Electricity and Magnetism I (Fall 06)
    - Molecular Biology I (Fall 06)
    - Molecular Biology I – Laboratory (Fall 06)
    - Nuclear Physics I (Spring 07)
    - Radiation Science I (Spring 07)
    - Radiation Damage and DNA Repair (Spring 07)
    - Radiation Biology (Spring 07 or Spr-08 depending on demand)

- Online Delivery Planned…
  - Online Curricula
    - PV: Intro to Modern Physics and Radiation Science (Spring 07)
    - PV: Intro to Nuclear and Particle Physics: Radiation Applications (Fall 07)
  - Course Video Teaching (MUSPIN)
    - Technical difficulties are hampering this effort
    - Looking for alternatives

Text/Reference Material Development Planned…

- Sample Series
  - Volume I: Space Radiation Environment
  - Volume II: Nuclear and Atomic Physics Measurements
  - Volume III: Radiation Transport Methodologies
  - Volume IV: Radiation Damage and Risk Management
  - Volume V: Space Design for Radiation Mitigation

Additional Progress…

- Equipment Acquisition Through Leveraging
  - TSU: ~10 Ci Cs-137 Radiation source (NASA - URC/TSU)
  - PV: 4-processor SGI Tzero W/S (NASA - CARR Sponsored)
  - PV: Gamma Spec Instrument (TAMU - DOE Sponsored)
- Advisory Committee Development
  - PV and TSU are identifying persons for the advisory committee
- Student Surveys and Tracking
  - Student survey data will be acquired through annual state-required surveys
  - Student demographics are being collected

- *More to come and other places to go……*
  - *Increase student enrollment*
  - *Promote student participation in internships, etc.*
  - *Finalize graduate degree program in Physics*
  - *Expand to other institutions*